

**Problem 1**

The following table shows you the unit labor requirements for producing wine and car in the US and France. Assume there is no wage difference between the two countries, and there is no quality difference for the products that both countries produce.

Unit labor requirements		
	Wine	Car
The U.S.	0.5 hour/L	0.1 hour/unit
France	0.8 hour/L	0.2 hour/unit

- a) What's the opportunity cost of producing TEN liters of wine in the US? What's the opportunity cost of producing TEN liters of wine in France? And in which industry does the US enjoy the comparative advantage? (5 points)

**Answer:** The opportunity cost of producing ONE liter of wine in the US is  $0.5/0.1 = 5$  cars. So the opportunity cost of producing TEN liters of wine in the US is  $5 \times 10 = 50$  cars. Similarly, the opportunity cost of producing TEN liters of wine in France is  $0.8/0.2 \times 10 = 40$  cars.

Since the opportunity cost of producing wine in the France is smaller than that in the US, France enjoys comparative advantage in producing wine and the US enjoys the comparative advantage in producing car.

- b) First convert the table above into a table of labor productivity, i.e., instead of expressing the numbers in unit labor requirements, express them in terms of quantity of products that can be produced using 1 labor hour. Then, decide in which industry France enjoys relatively higher labor productivity. (5 points)

**Answer:** Express the numbers in labor productivity, the table will change to:

Labor productivity, per labor hour		
	Wine	Car
The U.S.	2 liters/hour	10 units/hour
France	1.25 liters/hour	5 units/hour

In wine industry, the relative productivity between the US and France is  $2/1.25 = 1.6$ ; in auto industry, the relative productivity between the US and France is  $10/5 = 2$ . So the US enjoys relatively higher labor productivity in producing car, and France enjoys relatively higher labor productivity in wine industry. That's also where France has its comparative advantage.

- c) From your answers above, in which industry does the US enjoy the absolute advantage? And briefly explain why the US can benefit from free trade. (5 points)

**Answer:** From the answers above, we know US has absolute higher labor productivity in both wine ( $2 > 1.25$ ) and auto industries ( $10 > 5$ ), so the US enjoys absolute advantage in both industries.

Even though the US has absolute advantage in both industries, it is relatively more efficient in producing cars than wine. If we were to allow the US to specialize (completely or marginally more) in auto industry, and let France specialize in producing wine, each country now produces the good, which they are relatively better at. As a result, the total world output will increase. With free exchange via trade, both countries benefit from consuming more goods and at lower prices.

## Problem 2

The following questions are related to the issue of *trade and inequality*.

The US imports huge amount of goods from China each year. Because labor cost in China is much cheaper (10% of US level according to 2009 estimate), those imported goods tend to drive down the price of similar products in the US. Let's assume the US has two sectors: high-tech and low-tech, the latter of which is in direct competition with China.

- a) What is the impact of China's imports on relative wages between the two sectors in the US? Explain within the context of Stolper-Samuelson (SS) theorem.

**Answer:** China's exports will drive down the price of low-tech goods in the US. According to Stolper-Samuelson theorem, this increase of *relative price* of high-tech goods ( $P_{HT}/P_{LT}$ ) will increase the relative return of high-skilled labor ( $w_{HT}/w_{LT}$ ), which is used more intensively in the high-tech sector. The return of the high-skilled labor is just the wage they earn. So cheap Chinese exports will bring an increase of relative wage of high-skilled workers vs. low-skilled workers, thus increasing the income inequality between the two groups.

- b) If you were a top US policy maker and your goal is to keep US manufacturing industry strong so that it continues to provide job opportunities for the blue-collar workers. Meanwhile, you don't want to resort protectionist measures, which could potentially invoke a trade war with China and hurt consumers at home. What would be your policy proposition to President of the United States?

**Answer:** Although China has low-cost advantage, in order to keep blue-collar jobs at home (the goal), the US can offset this cost-advantage by significantly increasing

labor productivity  $q_{US}$  (note:  $q_{US} = 1/a_{US}$ ), such that  $\frac{q_{US}}{w_{US}} \geq \frac{q_{CN}}{w_{CN}}$ , which is the same

as  $a_{US}w_{US} \leq a_{CN}w_{CN}$ . One way of achieving the goal is to increase capital-labor ratio, K/L, for example, by buying smart machines. A sensible policy recommendation would be to provide incentives (such as a tax break) to induce firms to increase their capital investments in low-skilled industries. If firms substitute machine for labor,

then tax breaks should be only given to those firms that don't cut down workforce. This way, blue-collar jobs will stay at home due to regained international competitiveness in low-tech. Workers in these industries will also be paid higher wage due to increased labor productivity, shrinking the income gap with the high-skilled workers.

(Problem 2 was derived from a real world problem. For a more detailed discussion, please read the piece by Michael Spence at <http://economistonline.muogao.com/2010/07/americas-new-growth-strategy.html>)